

CLAIMS

1. A starting apparatus for an internal combustion engine,
which is mounted on an automobile to automatically start the
5 internal combustion engine after an auto stop of the internal
combustion engine, said starting apparatus comprising:

a cranking module that is always connected to an output
shaft of the internal combustion engine via a power transmission
member and cranks the internal combustion engine through
10 actuation of a rotating shaft, which is interlocked with
rotation of the output shaft;

a reverse rotation presumption module that presumes
reverse rotation of the internal combustion engine; and

a cranking control module that prohibits cranking of the
15 internal combustion engine regardless of fulfillment of an auto
start condition, when said reverse rotation presumption module
presumes the reverse rotation of the internal combustion
engine.

20 2. A starting apparatus in accordance with claim 1,
wherein said cranking control module controls said cranking
module to crank the internal combustion engine even before
completion of a stop operation of the internal combustion engine,
which is triggered by fulfillment of an auto stop condition
25 immediately before fulfillment of the auto start condition,
when said reverse rotation presumption module does not presume

the reverse rotation of the internal combustion engine under fulfillment of the auto start condition.

3. A starting apparatus in accordance with claim 1,
5 further comprising a revolution speed measurement module that measures a revolution speed of the internal combustion engine, wherein said reverse rotation presumption module presumes the reverse rotation of the internal combustion engine, based on the measured revolution speed of the internal combustion
10 engine.

4. A starting apparatus in accordance with claim 3, wherein said reverse rotation presumption module presumes the reverse rotation of the internal combustion engine until the
15 measured revolution speed of the internal combustion engine falls below a predetermined level and a predetermined time period elapses after the fall to eliminate any potential for the reverse rotation of the internal combustion engine.

20 5. A starting apparatus in accordance with claim 1, wherein the power transmission member is either of a full-time jaw gear that couples the output shaft with the rotating shaft and a belt that is spanned between the output shaft and the rotating shaft.

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6. A starting apparatus in accordance with claim 1,

wherein the power transmission member is made of resin.

7. An automobile with an internal combustion engine mounted thereon, said automobile comprising:

5 a cranking module that is always connected to an output shaft of the internal combustion engine via a power transmission member and cranks the internal combustion engine through actuation of a rotating shaft, which is interlocked with rotation of the output shaft;

10 a reverse rotation presumption module that presumes reverse rotation of the internal combustion engine; and

 a cranking control module that prohibits cranking of the internal combustion engine regardless of fulfillment of an auto start condition, when said reverse rotation presumption module
15 presumes the reverse rotation of the internal combustion engine.

8. An automobile in accordance with claim 7, wherein said cranking control module controls said cranking module to crank
20 the internal combustion engine even before completion of a stop operation of the internal combustion engine, which is triggered by fulfillment of an auto stop condition immediately before fulfillment of the auto start condition, when said reverse rotation presumption module does not presume the reverse
25 rotation of the internal combustion engine under fulfillment of the auto start condition.

9. An automobile in accordance with claim 7, further comprising a revolution speed measurement module that measures a revolution speed of the internal combustion engine,

5 wherein said reverse rotation presumption module presumes the reverse rotation of the internal combustion engine, based on the measured revolution speed of the internal combustion engine.

10 10. An automobile in accordance with claim 9, wherein said reverse rotation presumption module presumes the reverse rotation of the internal combustion engine until the measured revolution speed of the internal combustion engine falls below a predetermined level and a predetermined time period elapses
15 after the fall to eliminate any potential for the reverse rotation of the internal combustion engine.

11. An automobile in accordance with claim 7, wherein the power transmission member is made of resin.